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There are certain lead and copper veins of doubtful affiliation which do not appear to belong to any of the groups described and which seem to have no genetic relation to igneous rocks. They are, so far as developed, of small importance.

The copper deposits in sandstone, which, in part at least, replace carbonaceous material and which appear to have no direct connection with igneous rocks, form a relatively unimportant, but an exceedingly interesting group. These ores are mainly in the "Red Beds." The minerals are chalcocite, bornite, chalcopyrite, pyrite, malachite, azurite, silica, barite, and gypsum. Frequently these deposits replace coal. Some ores carry a few ounces of silver to the ton of chalcocite.

It is believed that the metals known to have been present in pre-Cambrian areas were leached out of these as sulphates, and redeposited in sediments that collected in inland lakes or seas. In part they were deposited as the solid detrital sulphides. When surface waters leached such beds, copper was dissolved. The waters of the Red Beds are known to be rich in chlorides and sulphates. From the organic matter in the beds, hydrogen sulphide would be added, and this would readily precipitate copper sulphide.

Pages 82 to 348 contain detailed descriptions of the many mining districts.

W. H. E.

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*Syllabus of a Course of Lectures on Economic Geology.* By JOHN C. BRANNER. Published by Stanford University. 3d ed., 1911. Pp. 503.

This syllabus is intended for the use of students in college and afterward. The method of treatment of the various subjects is mainly by outlines, which are to be expanded by notes from lectures, readings, and observation, and written out on blank pages opposite the outlines. Numerous text figures and cross-sections of mines add greatly to the value of the book. The references are full, well chosen, and up to date.

W. H. E.

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*Descriptive Mineralogy, with Especial Reference to the Occurrences and Uses of Minerals.* By EDWARD HENRY KRAUS. Ann Arbor, Mich.: George Wahr, 1910.

The book contains 334 pages of text and about the same number of blank pages for students' notes. It is designed primarily for the student of general mineralogy, with little reference to microscopical optics.

The systematic treatment of crystallography which the author published several years ago is not incorporated in the *Mineralogy*. The treatment and the lists of occurrences appear to be comprehensive. As in most textbooks in mineralogy, the references to sources of information relating to occurrences are inadequate. Such references, although adding greatly to its bulk, would vastly increase the usefulness of a textbook on mineralogy. A valuable feature is a group of tables listing separately the minerals containing each element.

W. H. E.

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*The Pleistocene Deposits in Warren County, Iowa.* By JOHN LITTLEFIELD TILTON. Chicago: The University of Chicago Press, 1911. Pp. 42; figs. 7.

As Warren County lies just south of Des Moines beyond the reach of the later ice invasions, the chief Pleistocene features of this region are the sub-Aftonian and Kansan till sheets, the interglacial Aftonian sands and gravels, and the post-Kansan loessial and other deposits. The most serious problem is found in differentiating the sub-Aftonian and Kansan tills, especially since the intervening Aftonian horizon-marker sometimes becomes so scant or obscure as to afford little help in separating the two tills. Though both till sheets were deposited by glaciers from the Keewatin gathering-ground, certain minor differences are cited by the author as distinguishing them. Large pebbles and boulders are said to be more common in the Kansan than in the sub-Aftonian in the region under study. Among the stony constituents the author notes red quartzite as characteristic of the Kansan but not of the Aftonian and sub-Aftonian, a view supported by a series of pebble classifications made in the typical Aftonian region by the reviewer.

The author assigns much greater thickness to the sub-Aftonian than to the Kansan in the region under study and attributes much of the present topography to drainage lines cut in this older drift during the Aftonian interglacial period, believing that, while the later Kansan invasion has partially masked this Aftonian topography by concealing some of the minor valleys, it has not obliterated the larger ones.

R. T. C.